

AD-A239 879



 **Micrion**

August 7, 1991

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Mr. Robert Reams
Harry Diamond Laboratories
2800 Powder Mill Road
Adelphi, MD 20783-1197

Dear Bob:

This is the 10th bimonthly report detailing work done on contract N00014-89-C-2238 during June and July, 1991.

3.31 Advanced Column Development

The production prototype column was installed on the column test stand. This is different than the original test stand in that it is the stand used to test production ready columns with production software and electronics, as well as testing column stability over time. The new electronics and operating system designed for the 0.25 um system were successfully linked to the column.

The performance of the column is excellent: we can resolve 20 nm features on a test sample, and multiple users routinely use the column without arcing problems.

The final column will be integrated into the 0.25 um repair system in October 1991.

3.32 Repairs

The JEOL field emission SEM was installed at Micrion in June. We designed mask holders to allow use with a transmission detector for metrology. Although reasonable images have been obtained we have not signed off the SEM yet due to unresolved vibration issues.

The SEM is being used several days a week to analyze the results of edgfinding experiments and for verifying thicknesses of small tungsten depositions.

We repaired 20 defects on an IBM X-ray mask and gave it to D.Stevens, IBM Burlington, to take to Brookhaven for exposure to the synchrotron.

Although many aspects of the defect data transfer link between KLA and Micrion are being worked out, the issue of data rotation remains. Specifically the Cr/Qz pattern that KLA inspects is rotated during exposure compared to the pattern on the X-ray mask. KLA only transfers coordinates based on their system, and Micrion then translates the coordinates into the Micrion system. There is

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no provision for rotation. Also by not having the actual coordinates Micrion can not inspect the repaired defects in-house to verify repair.

Micrion has decided to mathematically rotate the data, but this will take a few weeks.

3.33 System Stability

Nothing was done on this task.

3.34 Software

Successful integration of the column and 0.25 um electronics with the 0.25 um operating system and rudimentary software controls occurred. We will start creating the 0.25 um repair software in the fall in conjunction with 0.25 um system development.

3.35 Electronics

Although successful integration of electronics occurred we are not ready to begin testing the new capabilities for repair of X-ray masks. This will begin after integration of the 0.25 um subsystems this fall.

During the coming months we will be completing test development of repair processes for 0.5 um X-ray masks. In October we will disassemble the 0.5 um system to begin installation of the electronics, operating system, column, and metal deposition hardware. Process development will stop for several months while the integration occurs.

In December 1991, according to our projected expenditures, the funds for this contract will run out. Approved contract amounts were temporarily reduced by \$1,000,000 in October 1990. (See attached letter from D.Hunter, Treasurer). If funds are not replaced Micrion will cease work: the status of the project at that point will be a partially assembled, untested 0.25 um repair system. We sincerely hope that the amount is replaced to Micrion's contract by December 1991.

Sincerely



Diane K. Stewart
X-ray Program Manager

cc: N.Economou, Micrion
D.Hunter, Micrion
C.Libby, Micrion
M.Peckerar, NRL
R.Reams, HDL



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July 11, 1991

Dr. Martin Peckerar
Code 6804
Naval Research Laboratory
4555 Overlook Avenue, SW
Washington, D.C. 20375-5000

Dear Dr. Peckerar:

This report represents the latest Status of Funds Report on Contract No. N00014-89-C-2238 from the allowed commencement date of June 19, 1989, through June 30, 1991. Reports will be issued quarterly as required by the terms of the contract. The attached reports the status of funds expended by cost element (direct and indirect) and by task. In addition, an estimate of the remaining cost to complete the tasks included in Phase II and Phase III of the contract, which is scheduled to continue through September of 1992, is shown.

Through June 30, 1991, a total of \$4,386,127 has been expended and billed under Phase II and Phase III of the contract, representing 77 percent of the total approved contract amount for both phases. Due to the inclusion of the column development activity under the contract, as verbally agreed to in review meetings, the approved allocations for the various tasks under Phase II and Phase III have been modified to reflect the actual expected activity. The total contract approved costs and estimated cost to complete remains the same, and costs appear to be tracking closely with the technical progress of the program. At this point, Phase II has been completed with a slight negative variance from the contract amount, and this variance will be offset by expected favorable cost variances in Phase III. Phase III approved contract amounts were temporarily reduced by \$1,000,000 in October 1990, and the amounts will have to be replaced in order to complete Phase III of the program. Through June 30, 1991, the funds had not been restored to our knowledge.

Attached please find Schedule I and Schedule II which give a detailed breakdown of the totals referred to above by task number and direct and indirect cost.

If you have any questions, please feel free to contact me.

Sincerely,

A handwritten signature in dark ink, appearing to read "David M. Hunter".

David M. Hunter
Treasurer

DMH/pr

Attachment

cc: ACO, NRL, Code 3331.2, Washington, D.C.
J. Doherty, N. Economou, D. Stewart, C. Libby

MICRION CORPORATION
CONTRACT #N00014-89-C-2238
STATUS OF FUNDS REPORT - PHASE II (SCHEDULE I)

Inception Through 6/30/91

Task #	<u>Expended 6/18/89 Through 6/30/91</u>					<u>Expected (Under)/Over</u>
	<u>Direct Costs</u>	<u>Indirect* Costs</u>	<u>Total Costs</u>	<u>Total Contract Approved Costs</u>	<u>Estimated Cost To Complete</u>	
2.3.1	\$671,118	\$909,160	\$1,580,278	\$1,518,392	\$ 0	\$ 61,886
2.3.2	\$228,694	\$290,188	\$518,882	\$ 600,000	\$ 0	\$ (81,118)
2.3.3	\$ 91,186	\$178,840	\$270,026	\$ 260,000	\$ 0	\$ 10,026
2.3.4	\$156,412	\$280,812	\$437,224	\$ 406,000	\$ 0	\$ 31,224
2.3.5	\$ 58,051	\$114,598	\$172,649	\$ 180,000	\$ 0	\$ (7,351)
	\$1,205,461	\$1,773,598	\$2,979,059	\$2,964,392	\$ 0	\$ 14,667

% of Contract Phase II Approved Total 100.5%

* Includes fee of 6.709%

MICRION CORPORATION
 CONTRACT #N00014-89-C-2238
 STATUS OF FUNDS REPORT - PHASE III (SCHEDULE II)

Inception Through 6/30/91

Expended 6/18/89 Through 6/30/91

Task #	<u>Direct Costs</u>	<u>Indirect* Costs</u>	<u>Total Costs</u>	<u>Total Contract Approved Costs</u>	<u>Estimated Cost To Complete</u>	<u>Expected (Under)Over</u>
3.3.1	\$177,130	\$224,330	\$ 401,460	\$845,550	\$1,444,090	\$1,000,000
3.3.2	\$310,050	\$188,272	\$ 498,322	\$627,826	\$ 129,504	-----
3.3.3	\$ 13,472	\$ 27,502	\$ 40,974	\$436,902	\$ 381,261	\$ (14,667)
3.3.4	\$ 51,161	\$100,573	\$ 151,734	\$286,839	\$ 135,105	-----
3.3.5	\$134,791	\$179,523	\$ 314,314	\$425,148	\$ 110,834	-----
3.3.6	\$ 89	\$ 175	\$ 264	\$129,606	\$ 129,342	-----
	\$686,693	\$720,375	\$1,407,068	\$2,751,871 **	\$2,330,136	\$ 985,333 **

% of Contract Phase III Approved Total 51.13%

* Includes fee of 6.709%

** Reflects reduction in approved funds of \$1,000,000 on October 12, 1990

Total Contract Expended Phase II and Phase III = \$4,386,127 or 76.73% of Approved Contract Total